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## The Unique Properties of Placental Mesenchymal Stromal Cells: A Novel Source of Therapy for Congenital and Acquired Spinal Cord Injury.

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### Public Summary:

Spinal cord injury (SCI) is a devastating condition with no effective treatment options available. Spina bifida, the most common cause of a birth defect SCI, results from incomplete closure of the spinal canal during development which creates damage to the baby's spinal cord. Spina bifida treatment research has largely involved cell-based therapies that stems derived from adult tissue sources, such as bone-marrow, umbilical cord, and fat tissue. The capacity of these cells to differentiate into multiple cell types and release proteins that can protect the spinal cord has been recognized as an effective method to treat conditions, such as SCI. The first stem cell clinical trial for spinal bifida treatment is currently underway (NCT04652908), testing the efficacy of placental derived stem cell (PMSCs) implantation during fetal repair of spina bifida. PMSCs have been shown to exhibit uniquely properties that promote tissue re-growth and blood vessel formation compared to stem derived from other sources. This review will summarize the regenerative properties of PMSCs and their current use in cellular therapeutics for SCI treatment.

### Scientific Abstract:

Spinal cord injury (SCI) is a devastating condition with no reliable treatment. Spina bifida is the most common cause of congenital SCI. Cell-based therapies using mesenchymal stem/stromal cells (MSCs) have been largely utilized in SCI. Several clinical trials for acquired SCI use adult tissue-derived MSC sources, including bone-marrow, adipose, and umbilical cord tissues. The first stem/stromal cell clinical trial for spina bifida is currently underway (NCT04652908). The trial uses early gestational placental-derived mesenchymal stem/stromal cells (PMSCs) during the fetal repair of myelomeningocele. PMSCs have been shown to exhibit unique neuroprotective, angiogenic, and antioxidant properties, all which are promising applications for SCI. This review will summarize the unique properties and current applications of PMSCs and discuss their therapeutic role for acquired SCI.

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